6. Honghui

Program Name: Honghui.java **Input File: honghui.dat**

Honghui walked into an old mathematics classroom where he discovered a sequence of colored symbols on the chalkboard. The symbols were faded, but each was either an opening or closing parenthesis (`'('` or `')'` respectively).

Honghui wants to erase some symbols on the board to form a valid colored parenthesis sequence. Valid colored parenthesis sequences are described by the following grammar:

- An empty sequence is a valid colored parenthesis sequence.
- If `X` is a valid colored parenthesis sequence, then `(X)` is a valid colored parenthesis sequence if and only if the outer parentheses have the same color.
- If `X` and `Y` are valid colored parenthesis sequences, then their concatenation `XY` is a valid colored parenthesis sequence.

Each symbol takes a different amount of effort to erase. What is the minimum amount of effort Honghui has to put in such that the remaining sequence is a valid colored parentheses sequence?

Input: The first line of input is T (1 <= T <= 25), the number of test cases. Each test case starts with an integer N (1 <= N <= 400), the number of symbols on the chalkboard. The next line is a string of length N where every character is either '(' or ')', describing the symbols on the chalkboard. Then follows a line with N integers, the color of each symbol. The color is given as a positive integer in the range [1, N]. The next line of each test case has N integers, the effort required to erase each symbol in order. Each effort value is a positive integer at most 1,000,000.

Output: For each test case, output the minimum amount of effort required to make a valid parenthesis sequence by erasing some symbols. Format each answer with the case numbers as in the sample.

Sample input:

```
2
7
(())())
1 2 4 2 3 3 1
3 1 4 1 5 9 2
3
)))
3 3 3
1 2 3
```

Sample output:

```
Case #1: 4
Case #2: 6
```

Sample Explanation: In the first test case, erase the only symbol with color 4 to get the sequence `(()())`, which is balanced and has all matching colors. In the second case, all parentheses must be erased.